ABSTRACT

This invention relates to a system for estimating the position, speed and orientation of a vehicle (10), comprising means for determining the components of two noncollinear constant unit vectors $\hat{g}_b, \hat{e}_b$ according to vehicle body axes; means for determining the components of said noncollinear constant unit vectors $\bar{g}_t, \bar{e}_t$ according to Earth's axes; means for determining the three components of angular velocity $\hat{\omega}_b$ of the vehicle in body axes; means for correcting said angular velocity $\hat{\omega}_b$ with a correction u_ω and obtaining a corrected angular velocity $\hat{\omega}_b = \hat{\omega}_b + u_\omega$; a control module (14) implementing a control law to calculate said correction u_ω, where said control law is:

$$u_\omega = \sigma(\bar{g}_b \times \hat{g}_b + \hat{e}_b \times \hat{e}_b) \qquad [1]$$

where σ is a positive scalar,

such that upon using said corrected angular velocity $\hat{\omega}_b = \hat{\omega}_b + u_\omega$ as input to a module for integrating the kinematic equations, the latter are stable in the ISS sense and the error in the estimation of the direction cosine matrix $\hat{B}$ and of the Euler angles $\hat{\Phi}$ is bounded.